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17 January 1966

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MEMORANDUM FOR: [redacted] NPIC

SUBJECT: Background Information for NPIC's R&D Study Objective Paper re Use of Aerial Photography in Agriculture

1. The following background information is being submitted in response to your request at our meeting on 13 January 1966.

2. Our estimates of grain yields in the Communist countries (USSR, Eastern Europe and Communist China) are based on a number of factors including: (a) reports on weather and the condition of the grain crop at various times during the season; (b) progress in seeding and harvesting; (c) amount and progress of grain procurements by the state in the various administrative subdivisions; (d) statements by Communist officials, (e) qualitative consideration of changes in inputs (such as machinery, fertilizer, and seed) or incidence of disease and insect damage that would affect the grain harvest. Estimates are made of the yield of each of the major kinds of grain in the various regions of the particular country, and these estimates are compared with figures obtained for earlier years when crops and weather conditions in the different regions were similar to those prevailing in the year in question. These yields are then applied to the data on estimated grain acreage in arriving at estimates of production of the various kinds of grain and consequently the total grain harvest. Detailed information on weather conditions in all of these Communist countries is supplied to us on a current basis (10 day and 30 day summaries) by the US Air Force, Air Weather Service. The primary parameters include temperature, precipitation, estimated soil moisture availability, state of the ground and depth of snow cover. Other factors normally included in an International Weather code transmission (for example, cloud cover, wind speed, and so on) could be supplied given a need and the means to use such information advantageously. Reports prepared by the agricultural reporting officer or other embassy officials are another important source of information. Open source materials such as the newspapers, periodicals and handbooks from the various countries furnish much additional information. Some material is also obtained from classified sources. It is thus quite obvious that our method of estimating yields in Communist countries is substantially different from a US Department of Agriculture estimate of US grain production -- which is essentially an aggregation of thousands of individual estimates by Crop reporters scattered throughout the US.

3. Grain is the single most important crop in these Communist countries and is proclaimed to be the key to the further development of agriculture. Among the grains we recommend that top priority be

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given to wheat. After a new system of yield estimation has been developed we probably would wish to apply and test it initially for such important wheat areas as the Soviet "New lands" area (Northern Kazakhstan and West Siberia), the Ukraine, or the North China plain. These areas tend to be regions of marginal rainfall, resulting in widely fluctuating yields from one year to another. Given some degree of success in yield estimation for wheat in these areas we would want to extend the coverage to other grains (rice, rye, barley, oats, corn); other food crops such as sugar beets, potatoes, and vegetables; oilseed crops such as soybeans and sunflowers; and fiber crops such as cotton. We would also want to extend the area of coverage to other regions of the USSR and China, and to the Communist countries of Eastern Europe.

4. The permissible range of error in the yield estimate will depend to a considerable extent on the time that the estimate is made. For example, in the case of winter wheat which is seeded in the fall and harvested the following summer, it would be useful to us to have an estimate early in the spring to give us some measure as to how well the wheat survived the winter -- i.e. percentage of winterkill. At this stage even a qualitative estimate would be useful -- i.e. the stand is good or, alternatively, the stand has been reduced by 30% due to winterkill. In view of the fact that we must report on crop prospects throughout the growing season, crop estimates at various stages of growth during the spring and summer would be useful. An estimate at the critical "heading" period, for example, would be extremely useful. The permissible range of error in the yield estimate at this date, of course, would be somewhat greater than an estimate of the crop made just prior to harvest. A desirable goal would be a range of error of, say, ±5% for an estimate at harvest time and, say, ±15% for an estimate at the "heading" stage. In the initial stages of introducing a new method, a greater range of error would be quite acceptable and would be useful in checking and supplementing other methods of yield estimation.

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